

What is claimed is:

1. A voltage controlled oscillator using a resonator having a photonic bandgap structure and a feedforward 5 circuit, the voltage controlled oscillator comprising:

resonation means for resonating an oscillated signal by using a resonator having the photonic bandgap structure in order to increase a quality factor; and

10 oscillation means for controlling a phase of the oscillated signal by using the feedforward circuit in order to reduce phase noise.

2. The voltage controlled oscillator as recited in claim 1, wherein the resonation means includes:

15 a microstrip resonator having a photonic bandgap structure for improving a quality factor;

a DC bias circuit for generating a signal for outputting an oscillated signal;

20 a transistor operated by the DC bias circuit for applying a gain to a signal having a specific frequency;

a varactor diode having a variable characteristic varied according to variation of voltage for controlling the resonate frequency;

25 a  $\lambda/4$  stuve for controlling a state of open and short of the oscillated signal;

a DC ground for grounding the transistor; and

a matching circuit for connecting the oscillation

mean and the limiter by matching a phase and impedance of the oscillated signal to a preset value.

3. The voltage controlled oscillator as recited in  
5 claim 1, wherein the oscillation means includes:

a limiter for preventing to receive a resonated signal bigger than a predetermined size;

10 a first coupler for receiving the resonated signal from the limiter and copying a signal in order to generate a first copied signal;

a main amplifier for receiving the first copied signal and amplifying a the first copied signal in order to generate an amplified signal;

15 a second coupler for receiving the amplified signal and copying the amplified signal in order to generate a second copied signal;

20 a first delayer for receiving the first copied signal and delaying the first copied signal as long as the first copied signal passes the main amplifier and the second coupler in order to generate a first time delayed signal;

25 a phase converter for receiving the first time delayed signal, reversing the first time delayed signal in order to generate a reversed signal, receiving the second copied signal from the second coupler and combining the reversed signal and the second copied signal in order to generate a combined signal;

an noise amplifier for receiving the combined signal

and amplifying the combined signal outputted from the phase converter in order to generate a noise amplified signal;

a second time delay for receiving the second copied signal and delaying the second copied signal outputted from 5 the second coupler as long as the second copied signal passes the phase converter and the noise amplifier in order to generate a second time delayed signal; and

a coupler for combining the noise amplified signal and the second time delayed signal.

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4. A method of operations of the voltage controlled oscillator by using a phonic bandgap structure and a feedforward circuit, the method comprising the steps of:

a) resonating an oscillated signal by using a 15 resonator having the photonic bandgap structure in order to increase a quality factor; and

b) controlling a phase of the oscillated signal by using the feedforward circuit in order to reduce phase noise.

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